

FIRST INSIGHTS INTO LEACHATE TOXICITY OF FIELD COLLECTED PLASTICS TOWARDS MARINE ZOOPLANKTON

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Plastic pollution represents a global threat to marine ecosystems. Plastic litter can leach a variety of substances into marine environments; however, few studies are available on leachate toxicity on marine biota. In the frame of the JPI-O Response and the PRIN EMME project, we investigated the ecotoxicological effects of plastic leachates exposure on four marine zooplankton species

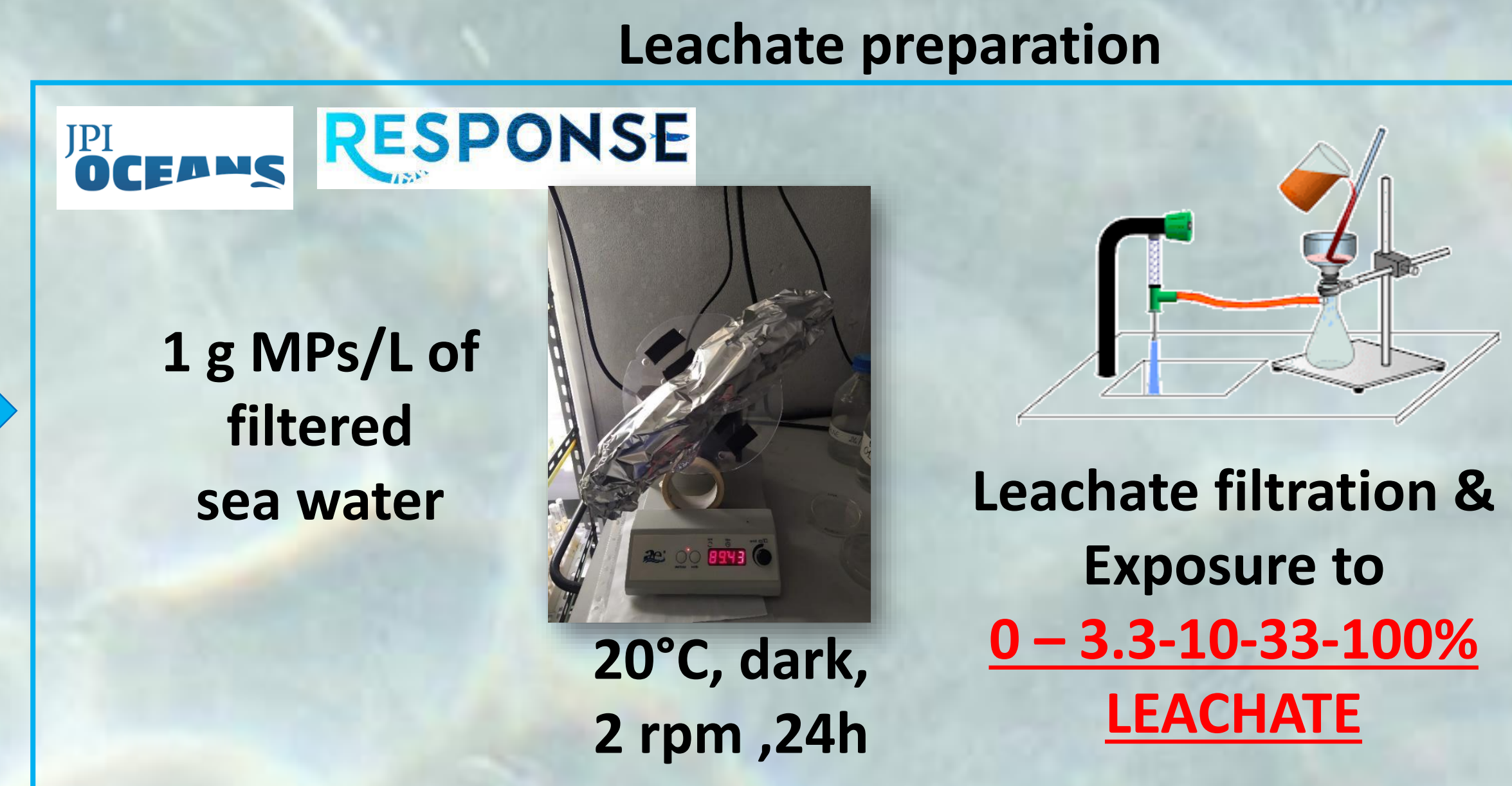
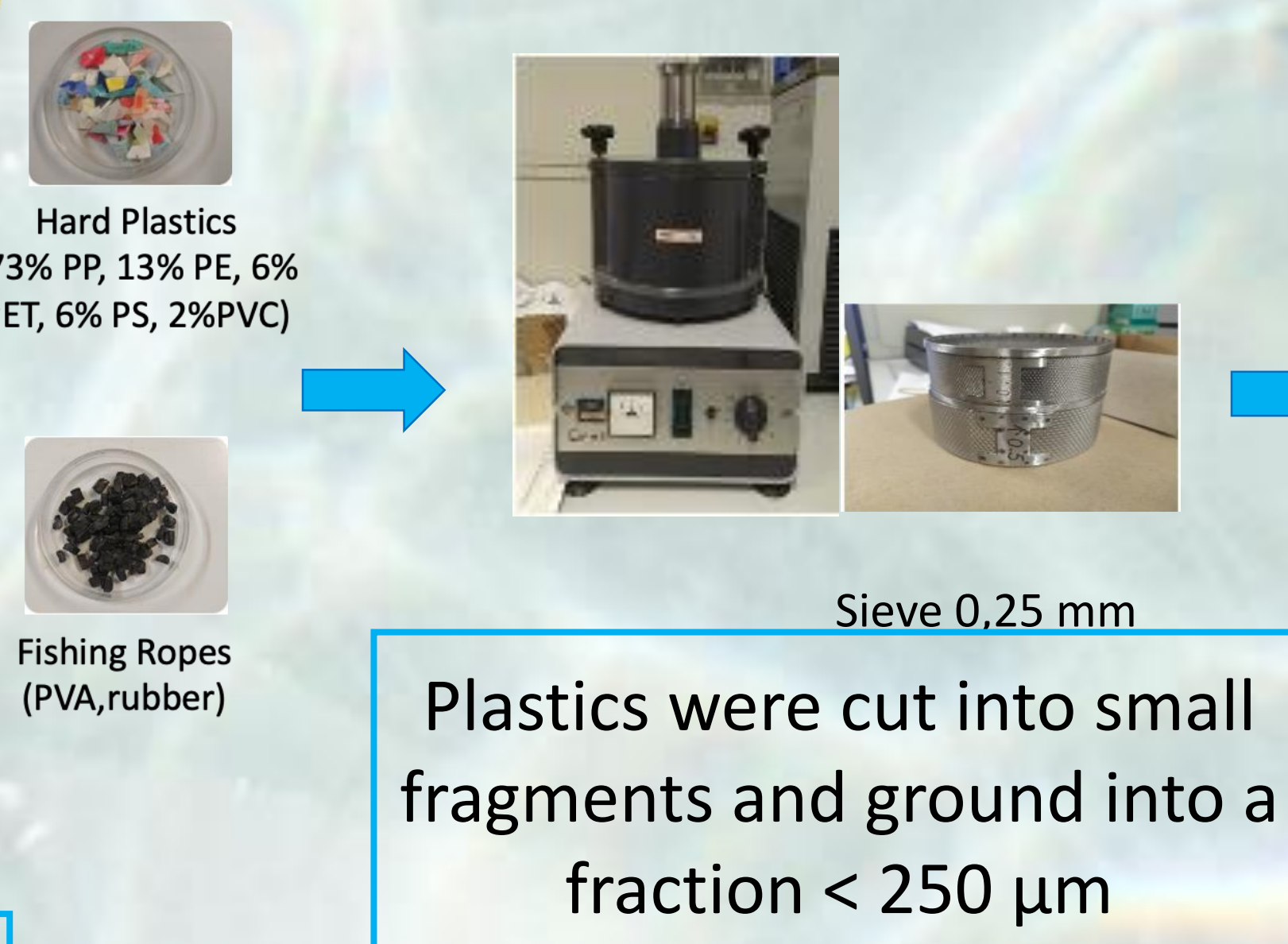
AIM OF THIS STUDY

To investigate the ecotoxicological effects of plastic leachate on 4 marine invertebrates

MATERIALS AND METHODS



Four typology of plastics (fishing ropes, hard plastics, plastic bottles, pellets) were collected in different geographic areas, including the Adriatic and Ligurian Sea and the Biscay Bay

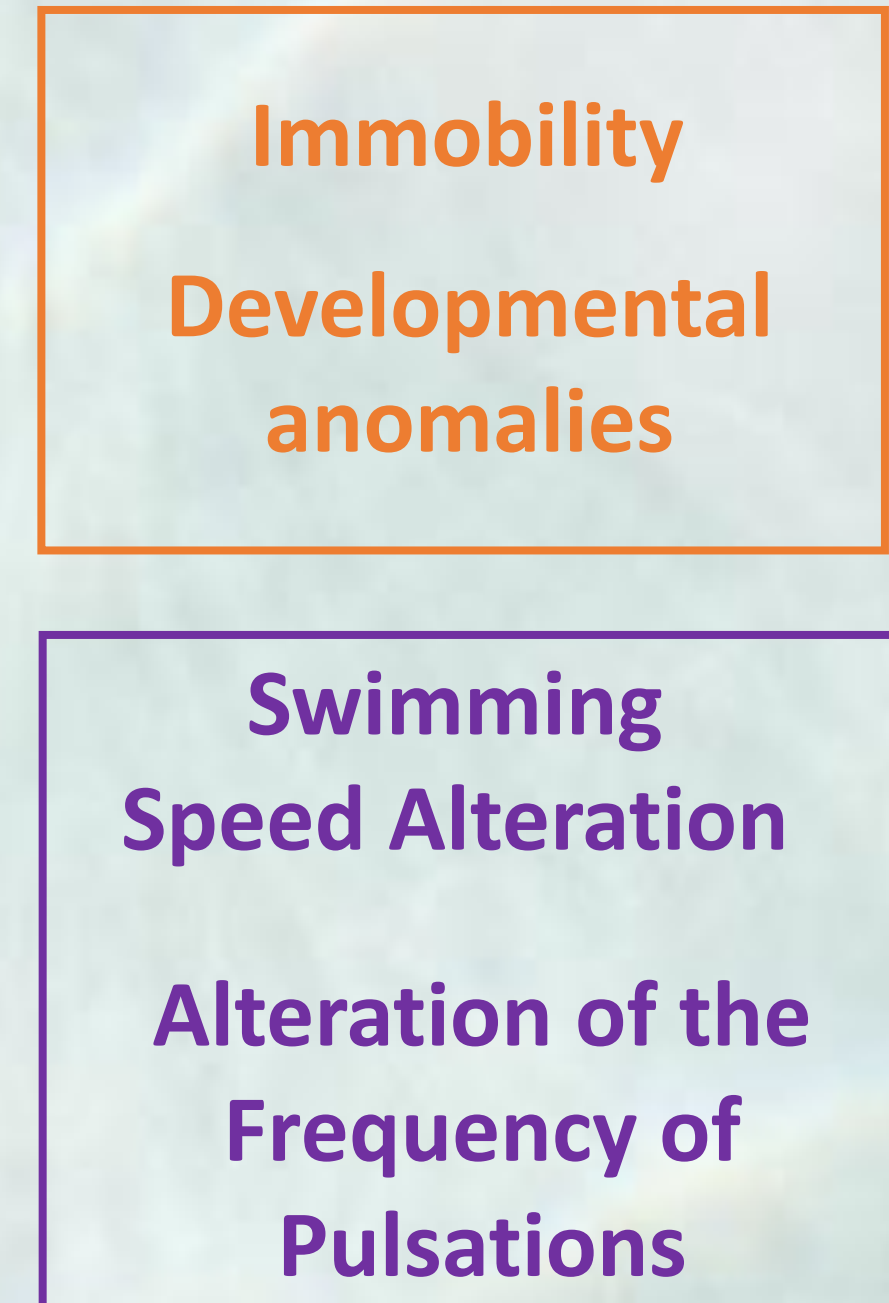


Ecotoxicological Endpoints

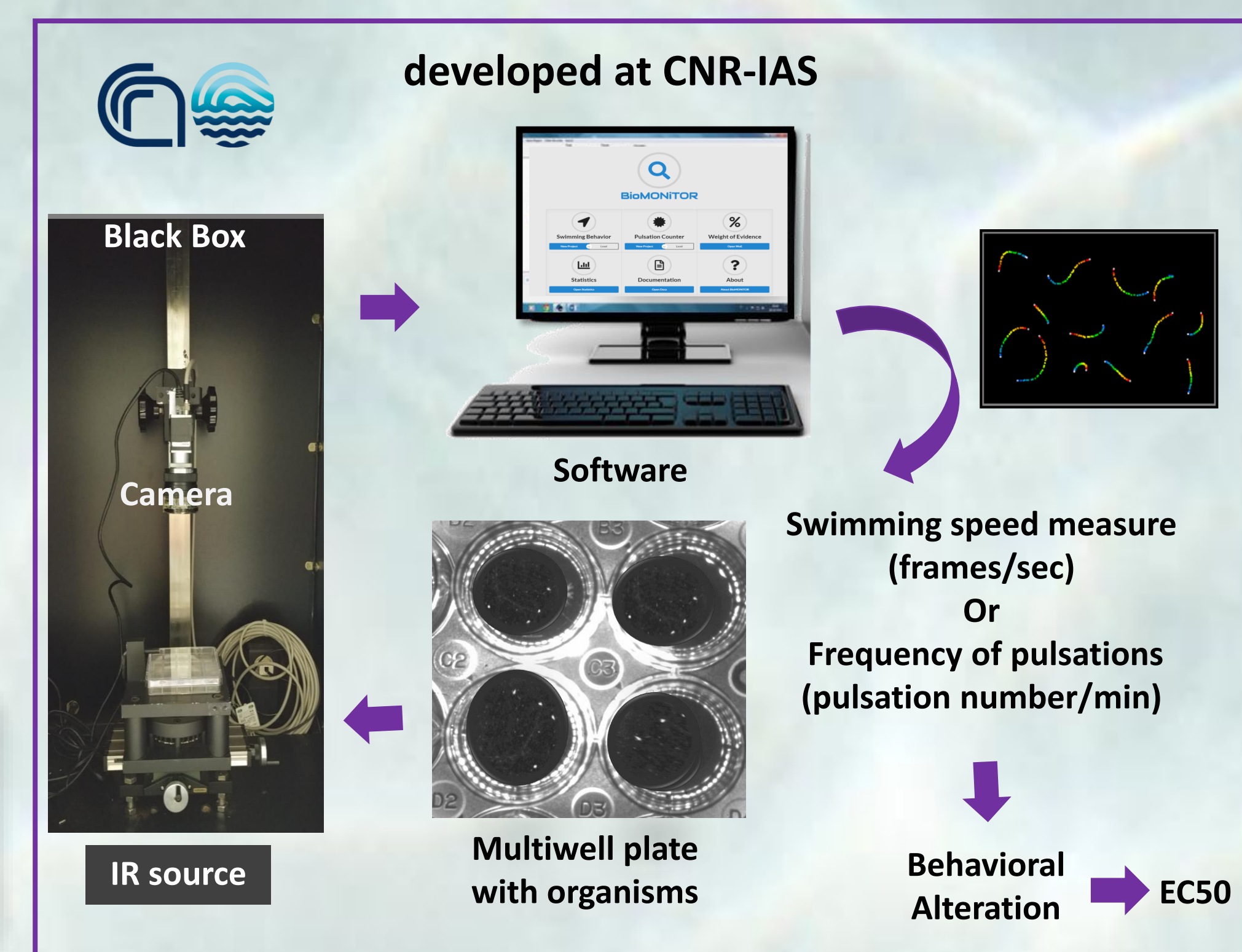
Model organisms

- A. amphitrite* nauplii
- Aurelia* sp. ephyrae
- B. plicatilis*
- P. lividus* larvae

48, 72 h exposure
 At 20 - 25°C in dark condition



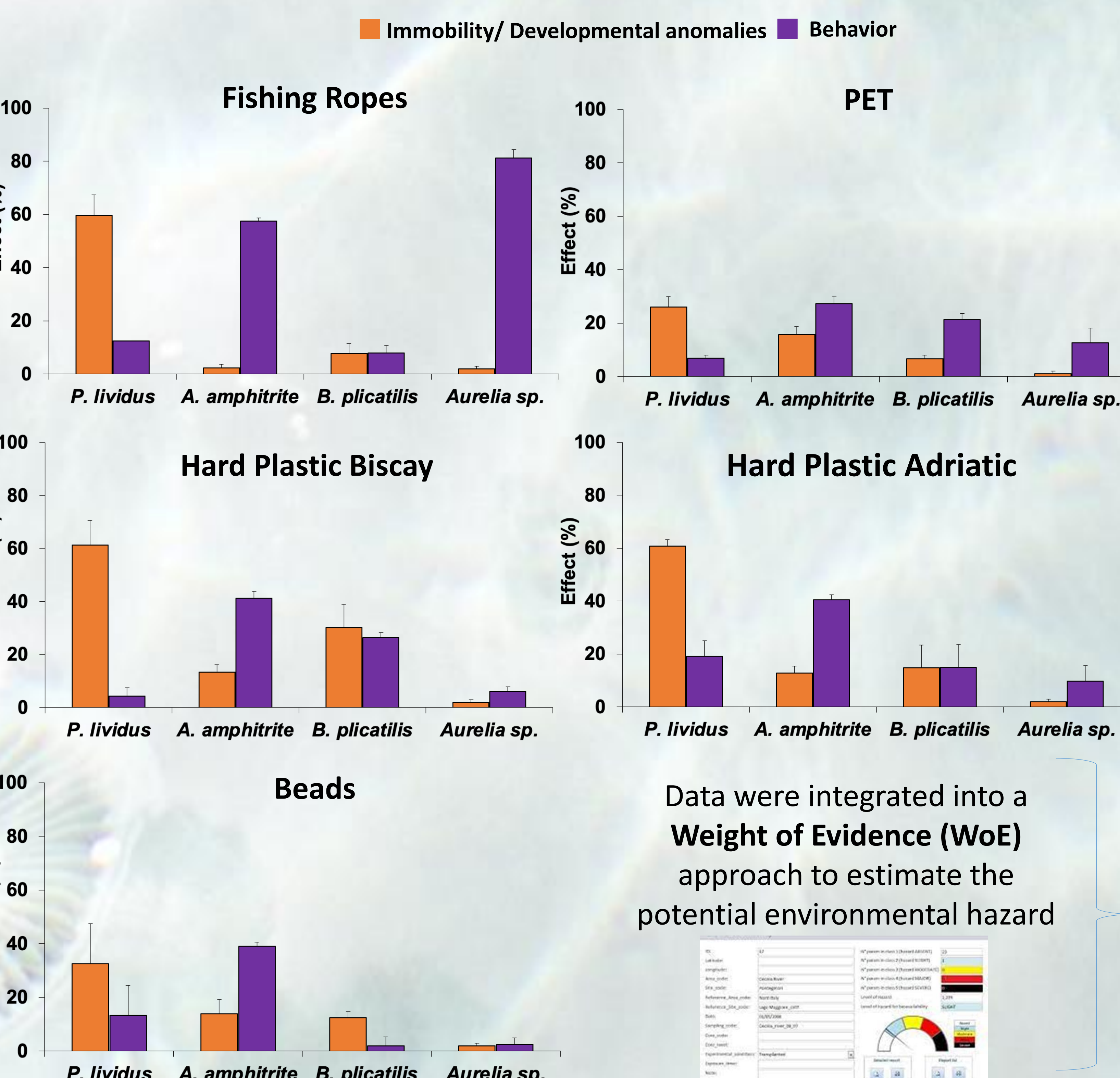
Swimming Behavioral Recorder (SBR) system



RESULTS

Exposure to fishing ropes from the Adriatic Sea affected sea urchin development, barnacle and jellyfish behavior. This effect was found at 1 g/L leachate and at all dilutions, allowing to calculate EC50 values.

EFFECTS AT 100% LEACHATE AFTER 48H

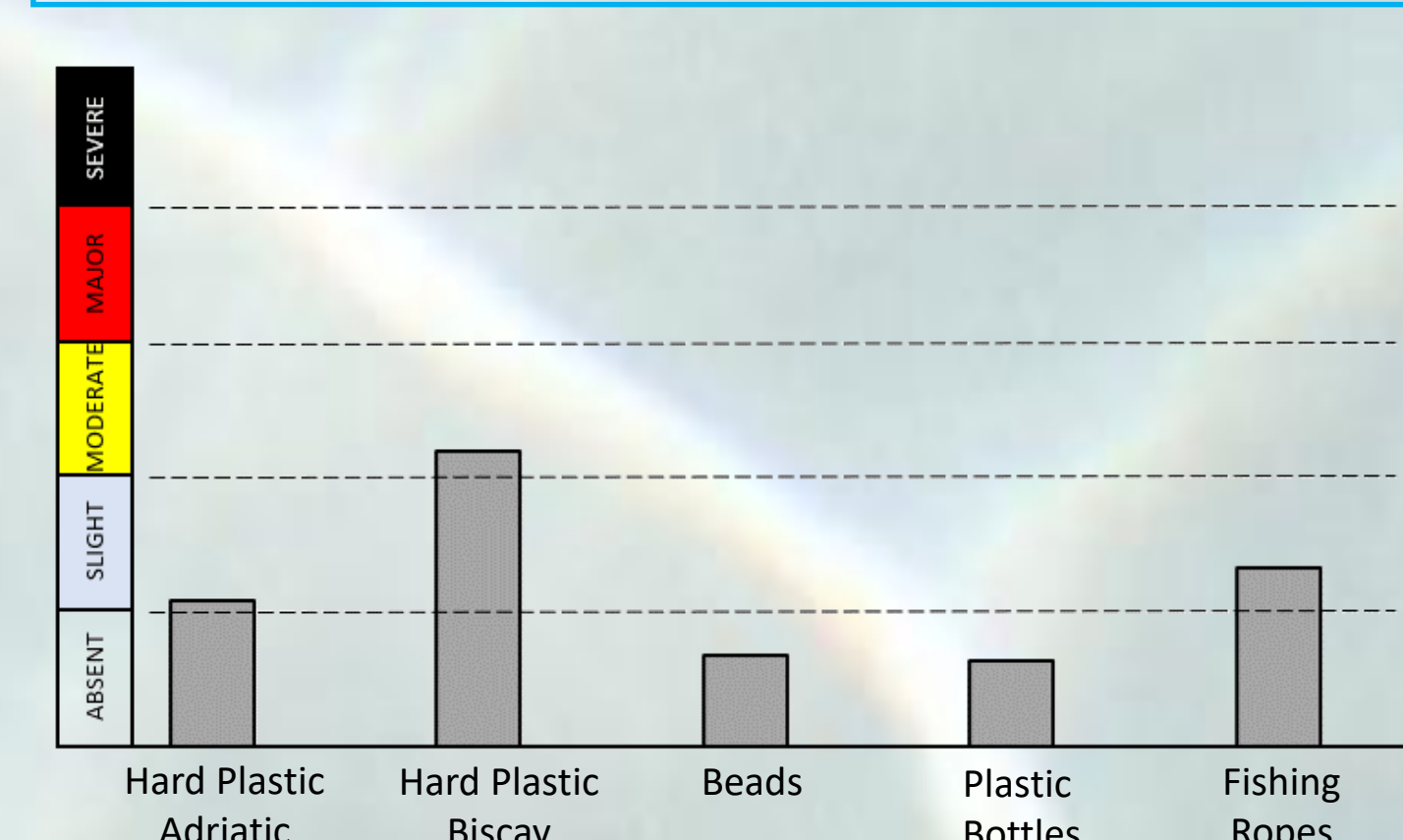


Area	Plastic category	Endpoint	<i>A. amphitrite</i>	<i>B. plicatilis</i>	<i>P. lividus</i>	<i>Aurelia</i> sp.
Adriatic Sea	Fishing Ropes	Imm./Develop Behavior	nc (>1 g/L) 0,66 (0,45 - 0,96) g/L	nc (>1 g/L) nc (>1 g/L)	0,32 (0,25-0,40) g/L nc (>1g/L)	nc (>1 g/L) 0,37 (0,29-0,47) g/L
	Hard plastics	Imm./Develop Behavior	nc (>1 g/L) nc (>1 g/L)	nc (>1 g/L) nc (>1 g/L)	0,64(0,48-0,85) g/L nc (>1g/L)	nc (>1 g/L) nc (>1 g/L)
Ligurian Sea	Plastic bottles	Imm./Develop Behavior	nc (>1 g/L) nc (>1 g/L)	nc (>1 g/L) nc (>1 g/L)	nc (>1g/L) nc (>1g/L)	nc (>1 g/L) nc (>1 g/L)
Biscay Bay	Hard plastic containers	Imm./Develop Behavior	nc (>1 g/L) nc (>1 g/L)	nc (>1 g/L) nc (>1 g/L)	0,51(0,24-1) g/L nc (>1g/L)	nc (>1 g/L) nc (>1 g/L)
	Beads	Imm./Develop Behavior	nc (>1 g/L) nc (>1 g/L)	nc (>1 g/L) nc (>1 g/L)	nc (>1 g/L) nc (>1g/L)	nc (>1 g/L) nc (>1 g/L)

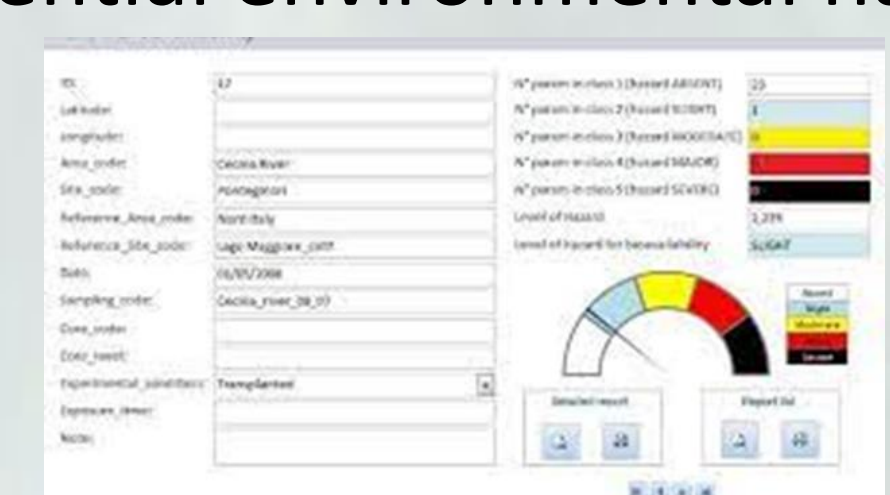
A toxic effect (>50%) was observed in sea urchin larvae development after exposure to hard plastics, independently from the geographic area

Plastic category	Ecotoxicological Hazard
Fishing Ropes	SLIGHT
Hard plastic Adriatic	SLIGHT
Hard Plastic Biscay	MODERATE
Plastic Bottles	ABSENT
Beads	ABSENT

Despite the EC50 values, the WoE approach estimated a moderate and slight risk due to exposure to hard plastics and fishing ropes



Data were integrated into a Weight of Evidence (WoE) approach to estimate the potential environmental hazard



NEXT

Chemical characterization is needed to clarify if the slight and moderate ecotoxicological hazard of the fishing ropes and hard plastics estimated by the WoE may be ascribed to additives or sorbed chemicals released during leachate process